DOCUMENT RESUME

ED 178 154 PS 010 549

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TITLE Children's Conception of Price as a Function of Questions Asked.
INSTITUTION Gothenburg Univ. (Sweden). Inst. of Education.
PUB DATE Mar 79
NOTE 13p.; Paper presented at the Annual Meeting of the Nordic Society for Educational Research (Aalborg, Denmark, October 19-22, 1978)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Abstract Reasoning; *Cognitive Measurement; *Cognitive Processes; *Developmental Stages; Elementary Education; *Elementary School Students; *Preschool Children; Preschool Education
IDENTIFIERS *Conception Of Price; Contextual Factors; *Piaget (Jean)

ABSTRACT

An experiment concerning children's conceptions of price was conducted to investigate the influence of the context of a problem on its apprehension. A total of 120 children of several age groups (nursery school, grades 2, 4, and 6) were interviewed individually. An initial question was asked ("Why does a bun cost about one Swedish crown?"), followed by a number of comparative questions ("Why does a bicycle cost more than a ball?"; "Why does a diamond ring cost more than a bicycle?"), and then a repeat of the original question. Comparison of answers to the initial question with a "best answer" judged from all the questions revealed more advanced responses on the best answer. The main changes were (1) an increment in answers expressing the idea that prices are determined by the relationship between supply and demand for commodities; and (2) a decrement in ignorant answers. This improvement seemed to be primarily in response to the comparative questions, as there was considerable regression to the initial mode of response when the initial question was repeated the second time. These results raise questions about the content-neutral nature of cognitive structures implied by Piaget's theory of cognitive stages. It is suggested that the exceptions to the stable pattern of thinking implied by Piaget's theory ought to be considered as the rule rather than the exception. (Author/SS)

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CHILDREN'S CONCEPTION OF PRICE AS A FUNCTION OF QUESTIONS ASKED

Paper presented at the annual meeting of the NFPF (Nordic Society for Educational Research) in Aalborg, Denmark. October 19-22, 1978.

Lars Owe Dahlgren

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PS 010549

No 81 March 1979

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In the developmental psychology of Jean Piaget, the concept of 'cognitive stage' is very central. A stage is characterized by a specific way of intellectual functioning in a number of important aspects. Children in the same stage of development apprehend concepts like time, space, causality etc in a similar way and the strategy they use to solve intellectual or practical problems possess a considerable degree of concordance.

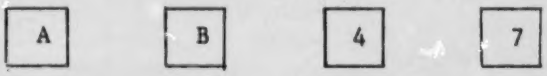
The transition from one stage of development to another is a prolonged process and does not occur from one day to another. Most of the change is characterized by oscillations between varoius conceptions of phenomena and various strategies of thinking to the extent that these periods have been regarded as separate stages, so called transitional stages (Piaget, 1955). A transitional stage is also characterized by a lack of stability in the sense that mental operations can be of different kinds dependent on which concept or phenomenon is actualized. This lack of stability to some extent remains even when the individual has moved into a specific stage. This horizontal décalage means, for instance, that the ability of conservation occurs at different ages. (Number 7-8 years, wight 9-10 years, volume 11-12 years. Piaget & Inhelder, 1941.)

However, some experiments have been carried out, where it appears that this instability seems to be the rule rather than the exception. In experiments made by Aebli (1963) it was shown that the performance on a multiclassification task in a group of 8-year-old children varied between zero and hundred percent passed, dependent on how the context of the problem was chosen.

Hundeide (1977) describes an experiment on the classical class inclusion task where the lack of stability is clearly illustrated. The problem was to judge whether there where more cups than there were things to drink out of in a picture of five cups and two glasses. The problem was presented in two different ways. In one presentation the question was put to the child after he had been presented the picture and in another the question was put before the picture was shown. Nineteen out of thirtysix children mastered the problem under the former condition while thirtyone were able to solve it when the question was put beforehand.

In a study by Wason & Johnson-Laird (1972), two variations of a logical problem were put to a group of students. The nature of the problem is such that an individual at the stage of formal operations should possess the necessary cognitive prerequisites to solve it.

In the experiment, a set of cards, each card with a letter on one side and a figure on the other, was presented to the subjects:



The following statement was given as a condition:

> *"If there is a vowel on one side of the card, there is an even figure on the other side."*

The task to be solved was to decide which card(s) that had to be turned over in order to judge the truth value of the statement.

Only very few of the students mastered the task. A very common solution was "A" and "4". This implies that verificaton rather than falsification is the strategy preferred for solving problems of this kind (Since nothing is said in the statement about cards with a consonant and an even figure on them, it is not necessary to turn the card with a 4 on it.)

The basic structure of this problem can be presented in other contexts. Wason and Johnson-Laird also presented the folowing problem. The subjects were asked to pretend that they were postmen and that their objective was to check the observance of the following rule: "If there is a 15 p stamp on the front, then the envelope is sealed".

Thereafter they were presented 4 envelopes, one with a 15 and one with a 10 p stamp on it. Two of the envelopes were face down, one being open and the other sealed. The subjects were asked to judge which envelopes they had to turn in order to check the truth value of the statement.

This version of the problem appeared to be much easier to solve. Bearing in mind the fact that only a few persons managed to solve the letter-and-figure version, far more than half of the group managed to solve the envelope version.

One question of great interest here is whether it is possible to assume that the specificity and identity of a structure can be presented in various contexts. We will return to this problem in the discussion part.

The main point in the experiments referred to is that is has repeatedly been demonstrated that the context of a concept or a problem has a decisive influence on how it will be apprehended. These findings seems to be incompatible with the content-neutral nature of cognitive structures that is implied by Piagets theory of cognitive stages. In the following we shall report and comment on an experiment where the instability and contextual dependency of childrens' conceptions of price is evident.

Method

In single-subject interview situations a number of questions were presented about the price of commodities and its origin. The first question was simply formulated:

"Why does a bun cost about one (Swedish) crown?"

Thereafter a number of comparative questions were given:

"Why does a bicycle cost more than a ball?"

"Why does a diamond ring cost more than a bicycle?"

Thereafter the original question was repeated.

Subjects

Thirty subjects in each of the four following age groups participated. Nursery school, grades two, four and six in primary school. The total number is thus 120 subjects.

Results

The answers to the four questions were analyzed and four distinct categories of conception of price were found.

A. Price is determined by the relationship between supply and demand for commodities.

B. Price is determined by the value of a commodity or the accumulated value of its constituents.

C. Price is determined by other properties of commodities than value such as taste, shape, size etc.

D. Ignorant answers.

The A and B categories were also found in another study where a group of university students were the subjects. (Dahlgren & Marton, 1977.)

The conceptual categories are qualitatively different. The difference between A and B can be described in terms of whether the price is conceptualized in system-oriented terms (which is more dynamic and abstract) or whether it is regarded as a property of a commodity (which is both more static and concrete). Category C is even more primitive than B in the sense that it explains the basis for pricing in terms of qualities of human perception. C is probably also a sign of ego-referring answers to the question.

The distribution of the answers to the original question when put for the first time is given in table 1.

Table 1. Distribution of answers to the question "Why does a bun cost about one (Swedish) crown?" (First presentation)

Category	Age group			
	Nursery School	2nd grade	4th grade	6th grade
A. Demand and/or supply	0	0	1	1
B. Value	3	18	25	27
C. Other properties	8	6	3	1
D. Ignorant	19	6	3	1

From a developmental point of view the most interesting trend in table 1 is the increment of category B and the decrement of category D. At the end of the age period, a number of answers implying the more abstract

supply-demand-structure also seem to appear.

As has been described above, after presenting the question about the price of the bun, a number of comparative questions were put. A "best answer" was judged for each subject from the four questions presented, which also include the original question and the repetition of it at the end. The distribution of best answers over the four categories is presented in table 2.

Table 2. Distribution of best answers to the questions about the price concept.

Category	Age group			
	Nursery School	2nd grade	4th grade	6th grade
A. Demand and/or supply	0	6	14	17
B. Value	24	23	15	13
C. Other properties	5	1	1	0
D. Ignorant	1	0	0	0

The difference between the distribution in tables 1 and 2 is dramatic.

The main change is the increment of category A and the decrement of category D. The overall difference can be described as a general improvement in the answers. This is above all a result of more advanced answers to the second of the two comparative questions: "Why does a diamond-ring cost more than a bicycle?" The conflict created by the two comparative questions seems to have forced a majority of the subjects towards more advanced conceptions of price. This change, however, seems to be very unstable since there is considerable regression towards the conceptions that dominated in the original question, when this question was repeated after the comparative questions. The distribution of answers to the non-comparative question presented for the second time is found in table 3.

Table 3. Distribution of answers to the question "Why does a bun cost about one (Swedish) crown?" (Second presentation)

Category	Age group			
	Nursery School	2nd grade	4th grade	6th grade
A. Demand and/or supply	0	0	0	3
B. Value	2	2	23	26
C. Other properties	5	6	2	1
D. Ignorant	23	22	5	0

The distribution of answers shows a regression towards the pattern found when the question was presented for the first time. A scource of some confusion is the great proportion of ignorant answers in the 2nd grade as compared to the first presentation.

Discussion

The meaning of the concept of price is evidently not stable in children, at least not in the age span from 6-12 years.

One result of the study is that price can be conceptualized in three qualitatively different ways. Another finding is that the conceptualization can vary within individuals as well, dependent on in which context the concept is introduced. A third, and from a pedagogical point of view somewhat discouraging result, is that effects of contextual variation on the conception seem to have a very limited transfer value i.e. conceptions expressed under what seems to be favourable conditions fade away in new contexts.

The mechanism of the change between the absolute question: "Why does a bun cost about one crown?" and the comparative questions, "Why does a bicycle cost more than a ball" and "Why does a diamond ring cost more than a bicycle" can probably be related to (a) the price difference between the objects creates a relevant problem to the children that has to be explained and (b) the fact that the reason for the price difference that was given in the first case (the size of the object)

was not adequate in the second case, where the more expensive object was the smallest. This conflict is in several cases solved by an accomodation in piagetian terms i.e. empirical data that does not fit into an established structure has the power to change the structure in itself. This kind of accomodation, however, does not bring about a more general change of the conception of price; it is only applied in a specific context to solve a genuinely experienced conflict.

Normally, changes in an individuals conception are considered to be time-consuming in cases where the main aim is to have the student learn the prescribed meaning of a principle or concept. This means that the object of study is that which is to be learned. There is, however, an alternative way of looking at the problem of changing conceptions, meaning that it is possible to achieve the same kind of effects by means of contextual variation. This means that the object of study does not necessarily coincide with that which is to be learned but rather that the contextual variation is an expression of the conviction that understanding as an outcome of e.g. an educational experience is best promoted by situations which demand understanding as a strategy of learning.

The results of this study and of several others bring to the fore the classical question about the relationship between content och form. It is very often assumed that a factor behind the regularity in human intellectual functioning is the experience of structural identity between similar situations. This, in turn, implies a vertical dimension of awareness which allows for variations on a more superficial level. In many cases this vertical dimension is conceptualized to end up with a limited number of human abilities and personal traits which can be made objects of inquiry in themselves and can, if appropriately measured, be used for predictions about a person's future development.

It appears as if the importance of the context is so great that it is of greater interest to study a group of persons' conceptions of certain phenomena in certain contexts or to study one person's conception of certain phenomena in various contexts (which may mean that we study a person's conception of various phenomena). It should also be kept in mind that although in scientific connections a lot of measures are taken in order to homogenize the situation from an external perspective, the internal situation - may still vary quite a lot. In other words, it

should not be assumed that a constancy of the external context guarantees a constancy of the internal context. The first concept belongs to phenomena in the "real world", while the second belongs to phenomena in the "experienced world". (cf Marton, 1978)

The conception of "structures d'ensemble" as a kind of content-neutral readiness for certain conceptions of phenomena belonging to a specific "family" is therefore doubtful. The exceptions to the stable pattern of thinking implied in the piagetian theory of developmental stages, ought, in our opinion, to be considered as the rule rather than as exceptions. A conception can probably only very rarely be separated from its context in order to be analyzed in a form that is drained of its specific characteristics.

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